CHE101 - Extra Practice - Ch 1,2 - F21 - Ver 1 Score: _____/180

Name: _____ Class: _____ Date: _____

Instructions: Answer the following questions. Show ALL work for problems to receive full credit. Make sure to include proper units and significant figures for all answers.

[25 pt] 1. Name the scientist associated with each of the following discoveries or statements. Scientists may be used more than once, or not at all. (Options are: Aristotle, Arrhenius, Boyle, Chadwich, Cthulhu, Dalton, Democritus, Empedocles, Faraday, Goldstein, Lavosier, Mendeleev, Priestly, Proust, Rutherford, Stoney, Thomson)

(a) Shot alpha particles at gold foil. 1(a) **Rutherford**

(b) Electrons are deflected by electric and magnetic fields. 1(b) **Thomson**

(c) Matter is composed of the elements Fire, Wind, Earth, and Water 1(c) **Empedocles**

(d) Discovered the neutron. 1(d) **Chadwich**

(e) Substances dissolved in water form cations and anions. 1(e) **Faraday or Arrhenius**

(f) Conservation of Mass 1(f) **Lavosier**

(g) Atoms combine to form compounds in simple whole number ratios. 1(g) **Proust/Dalton**

(h) Disproved Phlogiston theory. 1(h) **Lavosier**

(i) First define an Element (also compounds and mixtures). 1(i) **Boyle**

(j) The nucleus of the atom is small, dense, and positively charged. 1(j) **Rutherford**

(k) Protons were first observed by this German physicist. 1(k) **Goldstein**

(l) Discovered electrons 1(l) **Thomson**

(m) Solved the missing mass problem and discovered the 3rd fundamental particle. 1(m) **Chadwich**

(n) Father of Chemistry. 1(n) **Boyle**

(o) Arranged elements in rows and columns 1(o) **Mendeleev**

(p) Plum Pudding Model (or Chocolate Chip Cookie Model) 1(p) **Thomson**

(q) Formulated a model to describe the properties of atoms (5 statements). 1(q) **Dalton**

(r) Great philosopher, horrible chemist. 1(r) **Aristotle**

(s) The nucleus of the atom is small. 1(s) **Rutherford**

(t) Matter is composed of tiny indivisible particles called "atomos" 1(t) **Democritus**

(u) Studied gases, defined atoms, elements, compounds and mixtures. 1(u) **Boyle**

(v) Performed experiments using a cathode ray tube to discover electrons. 1(v) **Thomson**

(w) Highlighted Quantitative measurements as being superior to Qualitative 1(w) **Lavosier**

(x) Observed that alpha particles pass through gold foil 99.999% of the time and concluded that the atom is mostly empty space. 1(x) **Rutherford**

(y) Everything is made up of Earth, Air, Wind, and Fire 1(y) **Empedocles**

[10 pt] 2. Do the following statements best describe a (S)olid, (L)iquid, or (G)as?

(a) A substance which always fills its container. 2(a) **G**

(b) The most compact state of matter 2(b) **S**

(c) The particles are mobile, yet cohering. 2(c) **L**

(d) Indefinite shape, definite volume. 2(d) **L**

(e) Highly compressible. 2(e) **G**

(f) Least compact state of matter 2(f) **G**

(g) Indefinite shape and indefinite volume 2(g) **G**

(h) The attractive forces (IMFs) are much stronger then the Kinetic Energy (Temperature) 2(h) **S**

(i) The atoms are held rigidly in place in a lattice 2(i) **S**

(j) Definite shape and definite volume 2(j) **S**

[10 pt] 3. Are the following statements true or false. For the false statements change them to be a true statement in the space provided.

(a) Solids are the most compact form of matter 3(a) **T**

(b) Liquids have indefinite shape and indefinite volume 3(b) **F - G or I/D**

(c) In gases the attractive forces (IMFs) are much stronger then the Kinetic Energy (Temperature) 3(c) **F - solids or much weak**

(d) In liquids the atoms are held rigidly in place in a lattice 3(d) **F - solids**

(e) In a liquid the attractive forces (IMF's) are similar in strength to the Kinetic Energy (Temperature) 3(e) **T**

[5 pt] 4. Do the following statements **BEST** describe an (E)lement, (C)ompound or (M)ixture? There may be more than one correct answer for each question.

(a) Chemically and physically separable 4(a) **M**

(b) Can be separated chemically 4(b) **C and M**

(c) Fixed Composition 4(c) **E and C**

(d) Inseparable 4(d) **E**

(e) Can be Homogeneous or Heterogeneous 4(e) **M**

[10 pt] 5. Are the following statements true or false. For the false statements change them to be a true statement in the space provided.

(a) Mixtures are chemically and physically separable — 5(a) **T**

(b) Elements can be separated chemically — 5(b) **F - C or not**

(c) A mixture is 2 or more elements chemically combined. — 5(c) **F - Compound**

(d) Compounds can have a variable composition — 5(d) **F - Definite**

(e) Compounds can be separated physically — 5(e) **F - chemically**

[5 pt] 6. Are the following statements true or false. For the false statements explain why they are false or change them to be a true statement in the space provided.

(a) Compounds are physically separable. — 6(a) **F - Mix/Chemical**

(b) Mixtures are physically and chemically separable. — 6(b) **T**

(c) Elements can be homogeneous or heterogeneous. — 6(c) **F - bad Q**

(d) Compounds have a fixed composition — 6(d) **T**

(e) Mixtures are pure substances — 6(e) **F - E/C**

[20 pt] 7. Are the following statements true or false. For the false statements explain why they are false or change them to be a true statement in the space provided.

(a) Electrons have a neutral charge. — 7(a) **F - negative**

(b) An electron is about 2000 times heavier than a proton. — 7(b) **F - lighter**

(c) Electrons are primarily responsible for forming bonds between atoms. — 7(c) **T**

(d) The difference between elements is the number of protons each has. — 7(d) **T**

(e) All atoms of a specific element have the same mass and size. — 7(e) **F - Isotopes**

(f) Cations are formed by gaining electrons. — 7(f) **F - losing**

(g) A neutral atom has the same number of electrons and neutrons. — 7(g) **F - protons**

(h) The nucleus of the atom contains the protons and electrons. — 7(h) **F - neutrons**

(i) Opposite charges repel. — 7(i) **T**

(j) Isotopes differ by the number of electrons each has. — 7(j) **F - neutrons**

(k) Neutrons have a positive charge. — 7(k) **F protons/neutral**

(l) An electron is about 2000 times heavier than a proton. — 7(l) **F lighter**

(m) Neutron are primarily responsible for forming bonds between atoms. 7(m) **F electrons/mass**

(n) The difference between elements is the number of protons each has. 7(n) **T**

(o) Isotopes are atoms which have the same number of protons but a different number of neutrons. 7(o) **T**

(p) Cations are formed by gaining electrons. 7(p) **F - Anions/losing**

(q) A neutral atom has the same number of protons and electrons. 7(q) **T**

(r) The nucleus of the atom contains the protons and electrons. 7(r) **F - neutrons**

(s) Opposite charges repel 7(s) **F - attract**

(t) The nucleus is small, dense and negatively charged. 7(t) **F - positively**

[5 pt] 8. Do the following statements best describe (p)rotons, (n)eutrons or (e)lectrons. There may be more than one correct answer for each question.

(a) Has a positive charge. 8(a) **p**

(b) Responsible for the majority of the mass of an atom. 8(b) **p and n**

(c) Forms bonds between atoms to form molecules. 8(c) **e**

(d) Has the smallest mass. 8(d) **e**

(e) Is contained in the nucleus of the atom. 8(e) **p and n**

[4 pt] 9. Given the following isotope, ${}^{17}_{8}O^{-2}$, answer the following:

(a) Number of Protons — 9(a) **8**

(b) Number of Neutrons — 9(b) **9**

(c) Number of Electrons — 9(c) **10**

(d) Is this an example of a cation or anion? — 9(d) **Anion**

[4 pt] 10. Write the isotope notation for an atom with 38 protons, 40 neutrons and 36 electrons:

10. ${}^{78}_{38}\mathbf{Sr}^{+2}$

[5 pt] 11. Given the following isotope, ${}^{42}_{17}X^{+2}$, list the number of:

(a) Protons — 11(a) **17**

(b) Neutrons — 11(b) **25**

(c) Electrons — 11(c) **15**

(d) What Element is this — 11(d) **Cl**

(e) Is this an example of a cation or anion? — 11(e) **Cation**

[4 pt] 12. Given the following isotope, ${}^{30}_{14}X^{-3}$, list the number of:

(a) Protons — 12(a) **14**

(b) Neutrons — 12(b) **16**

(c) Electrons — 12(c) **17**

(d) What Element is this — 12(d) **Si**

[3 pt] 13. Given the following isotope, ${}^{60}_{32}Ge^{+2}$, list the number of:

(a) Protons — 13(a) **32**

(b) Neutrons — 13(b) **28**

(c) Electrons — 13(c) **30**

[5 pt] 14. Sketch or write a chemical reaction showing the formation of a Al^{+3} cation from a neutral Al atom.

$Al \longrightarrow Al^{+3} + 3e^-$

[5 pt] 15. Sketch or write a chemical reaction showing the formation of a Cl^- anion from a neutral chlorine atom.

$Cl + e^- \longrightarrow Cl^{-1}$

[4 pt] 16. Sketch or write a chemical reaction showing the formation of a Mg^{+2} cation from a neutral Mg atom.

$Mg \longrightarrow Mg^{+2} + 2e^-$

[4 pt] 17. Sketch or write a chemical reaction showing the formation of a Br^- anion from a neutral Bromine atom.

$Br + e^- \longrightarrow Br^{-1}$

[3 pt] 18. Sketch or write a chemical reaction showing the formation of a Lithium cation from a neutral Lithium atom.

$Li \longrightarrow Li^{+1} + 1e^-$

[3 pt] 19. Sketch or write a chemical reaction showing the formation of a Phosphorus anion from a neutral Phosphorus atom.

$P + 3e^- \longrightarrow P^{-3}$

[4 pt] 20. Give the name or symbols for the 7 elements that are **Metalloids**. Why are these elements important to know?

B, Si, Ge, As, Sb, Te, Po/A
They separate the metals from the nonmetals allowing us to determine which compounds are Ionic and which are Covalent/Molecular

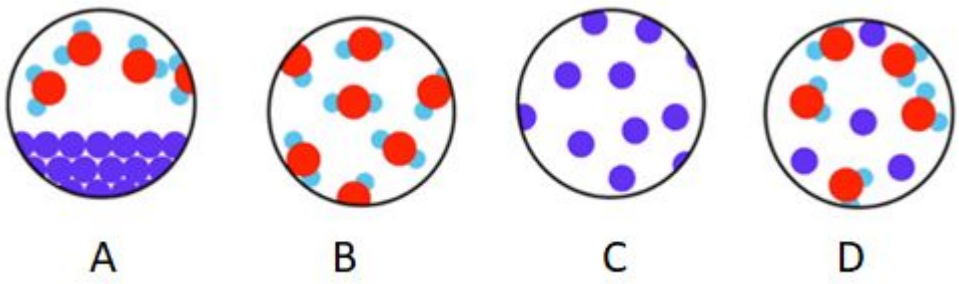
[4 pt] 21. Give the name or symbols for the elements known as the **Noble Gases**. Why are these elements in the same column on the periodic table?

He, Ne, Ar, Kr, Xe, Rn
Similar Physical and Chemical Properties

[4 pt] 22. Give the name or symbols for the elements known as the **Halogens**. Why are these elements in the same column on the periodic table?

F,Cl, Br, I
Similar Physical and Chemical Properties

[4 pt] 23. Which of the following pictures best illustrates a:



(a) Element **C**

(b) Compound **B**

(c) Homogeneous Mixture **D**

(d) Heterogeneous Mixture **A**

[5 pt] 24. Do the following statements **BEST** describe an (I)onic, (M/C) Molecular/Covalent or (B)oth compound?

(a) Two or more elements chemically combined. 24(a) **B**

(b) Gain/Lose electrons forming ions 24(b) **I**

(c) Low boiling points and melting points.. 24(c) **M/C**

(d) Conduct electricity when dissolved in water. 24(d) **I**

(e) Are formed between Non-metals and Non-metals. 24(e) **M/C**

[10 pt] 25. Are the following statements true or false. For the false statements change them to be a true statement in the space provided.

(a) Ionic compounds form discrete molecules 25(a) **F-Lattice/Molecular**

(b) Molecular compounds have lower melting points than ionic compounds 25(b) **T**

(c) Molecular compounds gain/lose electrons to form bonds. 25(c) **F - Ionic/share electron**

(d) Ionic compounds conduct electricity when dissolved in water 25(d) **T**

(e) A cation is formed when a neutral atom gains electrons 25(e) **F - Anion/lose**

[10 pt] 26. **Explain** how you determine the difference between (I)onic or (C)ovalent/Molecular compounds. Also, correctly identify the following compounds as either (I)onic or (C)ovalent/Molecular

Ionic - m/nm
Molecular nm/nm

(a) $Mg(OH)_2$ 26(a) **I**

(b) CO_2 26(b) **M**

(c) HNO_3 26(c) **M**

(d) C_2H_6 26(d) **M**

(e) Na_2O 26(e) **I**

(f) $Ba(NO_3)_2$ 26(f) **I**

(g) C_6H_{12} 26(g) **M**

(h) HCl 26(h) **M**

(i) P_4O_{10} 26(i) **M**

(j) KCl 26(j) **I**

[5 pt] 27. How many atoms of the indicated element are in each formula:

(a) Na in Na_2CO_3 — 27(a) **2**

(b) H in $(NH_4)_2SO_4$ — 27(b) **8**

(c) Cl in $FeCl_3$ — 27(c) **3**

(d) H in $HC_2H_3O_2$ — 27(d) **4**

(e) O in $Al(NO_3)_3$ — 27(e) **9**

(f) C in Na_2CO_3 — 27(f) **1**

(g) H in $(NH_4)_3PO_4$ — 27(g) **12**

(h) Cl in $MgCl_2$ — 27(h) **2**

(i) H in 2 H_2O — 27(i) **4**

(j) O in $Mg(NO_3)_2$ — 27(j) **6**